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ZANZIBAR PROTECTORATE

Annual Report

ON THE

Department of Agriculture

FOR THE YEAR

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DEPARTMENT OF AGRICULTURE

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Inspector of Produce	A. C. E. Callan.
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PREFACE.

A Summary of the Agricultural Policy of Government.

I. Land.

1. The mortgaging and alienation of agricultural land owned by Africans and Arabs is controlled and restricted by Boards instituted for this purpose under the Land Alienation Decree.

II. Food and Nutrition.

The active encouragement of the increased production of food crops and stock assisted by:—

Food Crops.

1. The introduction and selection of higher yielding strains of existing crops.

2. The introduction, trial, and acclimatisation of new food crops, with especial reference to those of improved nutritive value.

3. The issue of seeds and planting materials from demonstration stations and other plots throughout the Protectorate.

4. The reclamation, drainage, and irrigation of swamp areas in order to facilitate the production of rice and other food crops.

5. The demonstration of the possibility of growing vegetables, experimentation as to types of vegetables which flourish locally, and the general encouragement of the industry.

Livestock.

1. The use of quarantine methods for all imported cattle, sheep, and goats to prevent the introduction of diseases from which the Protectorate has hitherto been free and to limit the possibility of the re-introduction of diseases which have occurred from time to time in epidemic form.

2. The control of east coast fever by a system of dips throughout both islands.

3. The eradication or control of the tsetse fly in Zanzibar Island, and the prevention of its introduction into Pemba Island.

4. The breeding of improved quality cattle, sheep, and goats for sale to local farmers and dairymen.

5. The castration of inferior males.

6. The prevention of slaughter for food of useful female breeding stock.

7. The distribution of setting eggs and good strains of superior breeds of poultry.

III. Forestry.

1. The conservation of existing forest with especial regard to control of possible erosion.

2. The afforestation of certain areas with especial regard to the possibility of afforestation of certain areas of the "uwanda" country.

3. The conservation and controlled cutting of mangrove forests.

IV. Export Crops.

1. The departure from a two-crop economy by the propagation, testing, and encouragement of the growing of cacao as a third permanent export crop.

2. The encouragement of possible exportable crops, such as derris, chillies, tobacco, pawpaws for papain and fruit.

V. Marketing.

1. The Clove Growers Association, guarantee a fixed minimum price to growers for their clove crops. This price is adjusted yearly in conformity with market conditions. It provides facilities by which growers can obtain cash advances against their crops for a limited period.

2. The Association, acting on behalf of the Ministry of Food, also arranges all exports of copra and coconut oil on a price basis effective until 31st December, 1950.

3. All exports of tobacco are arranged through the Association and a guaranteed price is offered for chillies.

VI. Produce Quality Standards.

1. Pre-sale examination of cloves, clove stems, copra, and mangrove bark, under an Adulteration of Produce Decree.

2. Examination prior to export of cloves, mangrove bark and chillies, accompanied by grading according to determined standards.

3. Either pre-sale examination or grading prior to export of any other crops in respect of which such action is considered to be necessary.

4. Assistance in the construction and improvement of copra kilns.

VII. Credit.

Loans, secured on the crops themselves, for the cultivation and general improvement of plantations and advances against crops for picking expenses, are provided through the medium of the Clove Growers Association, an organisation under the ægis of Government.

VIII. Agricultural Education.

1. The training at Makerere of suitable candidates for higher posts in the subordinate technical staff.

2. The further training of those holding higher posts in the subordinate staff to fit them to fill senior staff posts.

3. The training at Kizimbani of all potential field assistants.

4. The provision of training courses for sons of farmers and others wishing to become progressive farmers.

5. The inculcation of a liking for farming and gardening, by the provision of school gardens, by all undergoing primary and secondary education.

SECTION I.

AGRICULTURE IN THE PROTECTORATE.

General.

1. There was no alleviation of the general food shortage, and this fact, coupled with unfavourable rains in the Protectorate, made the production of local foodstuffs a matter of undiminished concern both to the Department of Agriculture and the District administration. The development of cacao has proceeded satisfactorily, not altogether without vicissitudes, but with some extremely encouraging features, notably the unexpectedly high yield of the old trees at Dunga and the more than promising growth of the young ones at Selem.

Minor export crops, which constitute an important part of the development programme, continue to receive attention, and recent information has indicated that derris, the source of rotenone, may be one of the most important of these.

Agricultural Development Programme.

2. The Agricultural Development Programme, involving an expenditure of £127,000, under Scheme D.647, was approved by the Secretary of State in June, and since then a good deal of progress has been made.

3. Sites have been selected for the sub-experimental stations in Zanzibar and Pemba, the main framework of the layout completed, and some buildings put in hand. Five out of the eight demonstration plots have been also chosen and surveyed.

4. Cattle dip sites have been selected and construction will commence as soon as materials and supervisory staff are available.

5. So much information regarding cattle diseases has been gained from the various visits of Mr. H. J. Lowe, C.B.E., Director of Veterinary Services, Tanganyika, and Mr. A. H. Milne, Provincial Veterinary Officer, Tanganyika, as well as from the local work of Mr. Fazel din Ahmedi, that it is not thought that the full survey originally contemplated under Scheme R.33 will now be necessary. Provision for a European Veterinary Officer has been approved and his appointment is awaited.

6. The Kizimbani Stock Farm, formerly a charge against Scheme D.188, is now included under the main Scheme D.647. Funds under the former scheme are still available for the construction of a dip for Chukwani and houses for two milkers at Kizimbani.

7. A preliminary survey of the area at Kibonde Mzungu, which it is intended should be developed for vegetable growing under irrigation, has been completed, and measurements of the available water supply are now being made.

8. A survey of copra kilns throughout the Protectorate has been made and advisory work as to reconstruction and improvement has commenced.

9. Mr. W. A. Robertson, Forestry Advisor to the Secretary of State, visited Zanzibar towards the end of the year, in order to examine forestry problems in general. His advice was most welcome, but it will not be possible to draw up a full programme of work until a Conservator of Forests is appointed. In the mean time the Botanical Gardens at Migombani are being partially converted into forest nurseries.

Other visits included, Mr. A. Creech Jones, M.P., now Secretary of State for the Colonies, Sir Harold Tempany, C.M.G., the then Agricultural Advisor to the Secretary of State, accompanied by Sir Frank Engledow and Professor Munro, and Sir Ian Heilbron and Professor Simonsen representing the Colonial Products Research Council.

Clove Research Scheme.

10. Dr. F. J. Nutman, Plant Physiologist at the East African Agricultural Research Institute at Amani, arrived in the Protectorate in November to take up the post of Director of Clove Research, and has since been occupied in drawing up a comprehensive programme of research into sudden death, die back, and the general agronomy of the clove.

Weather.

11. The rainfall in both Zanzibar and Pemba has been from 15 per cent to 20 per cent lower than the average for the past ten years, the main shortfall occurring during the masika in the months of April and May. In addition January and February, though always dry months, had on this occasion practically no rain whatsoever, a circumstance which had a particularly adverse effect on early planted rice.

Typical figures are 56.90 inches at Kizimbani Experimental Station, as compared with an average of 75.37 inches over the past 12 years, and 68.67 inches at Wete in Pemba compared with an average of 77.28 inches over the past 26 years.

As a result a great deal of cassava failed to develop in reasonable time and necessity compelled the consumption of much of it in an immature condition.

Fortunately the rains during September, October, and November were really good, and by the end of the year there was much improvement.

Principal Crops.

12. *Cloves.*—The clove crop for the seasonal year July 1945 to June 1946, was one of the smallest on record, totalling only 6,564,876 lbs., of which 5,637,616 lbs. were from Pemba and 927,260 lbs. from Zanzibar. Annual production figures and graphs showing production over 10-year periods are given in Appendix III.

Fortunately the 1946-47 crop has been a very good one, and up to the 31st December, 1946, 19,634,358 lbs. had passed through the central clove market. The bulk of this has been a vuli or late crop, and picking is expected to continue well into the new year.

13. Picking, as is usual in the event of a heavy crop, has presented considerable difficulties, and though piece rates started at 15 to 20 cents a pishi (4 lb.), they rose as high as 30 or even 35 cents. There was no seasonal mainland labour to assist in harvesting the crop.

14. Exports on the other hand, stimulated by the pent up demand over the war period, totalled 34,748,896 lbs., 26,398,816 lbs. more than 1945, and 13,302,156 lb. more than the average for the past 20 years.

15. As a result of heavy exports following an extremely light crop stocks in hand fell to a very low level, and at the meeting of Legislative Council on 8th November, 1946, legal sanction was obtained to reduce the statutory minimum of cloves supplied by the Clove Growers Association for each export consignment from 50 per cent to 10 per cent.

16. The buying price of the Clove Growers Association per 100 lbs. delivered at the Association's depot in Zanzibar was raised according to the following table as from the 1st July:—

	Good quality.	Fair quality.	Poor quality.	Inferior quality.	Sweepings and cloves fit for distillation only.
	s. cts.	s. cts.	s. cts.	s. cts.	s. cts.
Price at 30th June, 1946	44 50	42 00	39 00	34 00	25 00
Revised price as from 1st July, 1946	47 50	45 00	42 00	37 00	28 00

Pemba buying prices were in every case Shs. 1/38 lower.

The Association's selling price remained unchanged at Shs. 55/- for Good quality, Shs. 52/- for Fair quality and Shs. 49/- for Poor quality. The difference between buying and selling price is now, except in the case of Good Quality, Shs. 7/- instead of Shs. 10/-.

The buying price per 100 lbs. for stems for distillation was again raised from Shs. 12/- to Shs. 13/50 for commercial quality and from Shs. 11/- to Shs. 12/50 for inferior quality.

During the first six months of the year the small quantities of cloves offering were rapidly absorbed at prices ranging between Shs. 47/25 and Shs. 53/50. During the second six months local market prices fluctuated to an even greater extent, being as low as Shs. 45/50 and rising as high as Shs. 57/00.

The prices ruling at the end of the year were between Shs. 48/- and Shs. 50/- per 100 lbs. of Grade II quality cloves.

The principal export market in 1946 was India with 19,017,376 lbs. representing 54.73 per cent of the total exports, followed by the Straits Settlements with 20.79 per cent and the United Kingdom, Aden, the United States and Holland, with 5.8, 4.8, 4.6 and 4.2 per cent respectively.

It is hoped that the exports to the Straits Settlements are indicative of a revival of interest in clove (scented) cigarettes.

17. The exports of clove oil, at 410,677 lbs. were well up to average, but considerably below the record figure of 525,313 lbs. for the previous year. Considerable quantities of low grade buds were again utilised in the distillery.

Exports were mainly to the United Kingdom under contract but some small sales were made both to the United States of America and Australia.

18. No mainland labour was available for picking what promises to be at least a 10 lakh crop, and there was very considerable competition for the limited supply of local pickers.

19. There are indications that sudden death casualties in Zanzibar are on the increase, but in Pemba there is no perceptible change.

The severe drought during the early months of the year caused the death of some 70,000 clove trees, mainly in waterlogged areas where they had only developed a shallow root system. The localities of Mwera, Koani and Chaani were particularly badly affected.

20. *Coconuts.*—Disposal of the exportable surplus of copra remained in the hands of the Ministry of Food, destinations, as in 1945, being East Africa and the Middle East. The exportable surplus of coconut oil was similarly controlled and all absorbed by Aden, Kenya and Cyprus, in that order.

21. The prices paid by the Ministry of Food for copra and coconut oil were increased as follows as from the 1st October, and to remain good until the end of 1950:—

	Former price per ton.			Revised price per ton.		
	£	s.	d.	£	s.	d.
Copra F.M.S. (in bags f.o.b.) ...	21	12	9	30	10	0
Copra F.M. (in bags f.o.b.) ...	20	19	7	30	00	0
Coconut Oil (naked f.o.b.) ...	39	6	0	50	4	0

These prices, even allowing for increased costs of production, are a considerable improvement on those previously in force, and have been well received by the trade. Unfortunately the price differential between F.M.S. and F.M. copra gives little incentive to improve the quality of the product.

22. Exports for the year amounted to 8,035 tons, a disappointing total as compared with an estimate of over 12,000 tons, and even less than the 1945 figure of 9,816 tons. They were, however, again affected by the local expression of coconut oil and manufacture of soap, and in addition the food shortage during part of the year led to a very greatly increased consumption of fresh nuts for food.

Furthermore 2,000 tons were lying in the godowns at the end of the year awaiting a shipping opportunity.

23. Local prices remained fairly steady up to towards the end of July, ranging between Shs. 14/57 and Shs. 20/43 per 100 lbs. for F.M.S. After that date prices rose very sharply in anticipation of an increase in the Ministry's contract price, and at one time reached Shs. 23/57. After the declaration of the revised price they fell, but at the end of the year had again risen to between Shs. 20/57 and Shs. 24/-. Best sun-dried copra, only obtainable from Government plantations, always fetched from 75cts. to Shs. 1/25 more than F.M.S.

24. Average sales from Government plantations within the copra quality standards were as follows:—

	January—End July.	August—September. On sale only.	October—December.
B.S.D. per 100 lbs.	Shs. 18/10—20/05	Shs. 23/-	Shs. 24/50—24/75
F.M.S. per 100 lbs.	Shs. 17/05—19/30	Shs. 21/75	Shs. 23/75—24/-

The percentage of best sun-dried produced on Government Plantations was 85.5, and of F.M.S. 14.5, exactly the same as in the previous year.

25. *Mangrove Bark.*—Exports of mangrove bark, at 11,698 tons, constituted a record. Shipments were fairly regular over the four quarters of the year; the United States of America being our best customer with 6,047 tons equivalent to 51.69 per cent and India next with 5,108 tons equivalent to 43.66 per cent of the total.

26. The Rules made in 1945 under the Agricultural Produce Export Decree continued to work reasonably satisfactory, and there has been an almost complete absence of complaints from overseas buyers.

Towards the end of the cutting season, which finally closed on 15th October, a considerable percentage of very thin and immature bark was bought by merchants and presented for export. In view of the resulting damage to young trees and as in any case this thin bark usually has a reduced tannin percentage, steps are to be taken either to render its cutting illegal or to prohibit cutting altogether in certain areas.

27. It is of interest to note that, generally speaking only, the non-fibrous bark (*Rhizophora mucronata*) is favoured by India, the Middle East, and the United Kingdom, while the United States are prepared to take both this and the fibrous bark (*Bruguiera gymnorhiza*). It is said that in India mangrove bark produces too light coloured a leather to be really popular.

28. The recent two year's exports, totalling 14,343 tons, are over four times the normal production for that period, and must result in very much lower exports for some years to come, irrespective of demand and price.

Food Crop Production.

29. Any hopes that 1946 would provide some easing of the food situation were doomed to disappointment. Imported foodstuffs were no more readily available than during the war years, and in some cases, most notably that of rice, they were very much harder to obtain.

30. In the Protectorate the position was complicated by a severe drought during January, February, and much of March, followed by an unusually light masika.

This resulted in the almost complete failure of the early planted rice crop, and a much reduced yield from the later planted.

The following figures give some idea of rice production in both islands compared to 1945.

	Estimated Production of Paddy in tons.		
	Zanzibar.	Pemba.	Total.
1945 ...	8,368	10,000	18,368
1946 ...	3,618	5,000	8,618

This still provided a welcome addition to the food supply of the country population, but left nothing, except at exorbitant prices, for the towns.

31. Root crops were also adversely affected by the drought, and up to August cassava made very poor growth. Fortunately there was a fair crop of sweet potatoes, but until September and the latter part of the year brought more favourable rains there was, in some areas, quite a serious shortage of local foodstuffs.

32. Not unnaturally the eastern seaboard also suffered from lack of rain, and the situation was not improved by the almost complete failure of the maize crop in some places.

33. The situation was met by additional imports of maize and mixed meal from the mainland, and anything in the nature of a famine was averted.

34. The following planting material directly concerned with increased food production has been either distributed free or sold.

	Unit.	Kizimbani and other Stations.	Pemba Stations.	Mainland.	Total
Cassava cuttings ...	Nos.	476,635	158,165	—	634,800
Sweet potato Slips ...	Nos.	162,250	241,706	—	403,956
Rice seed ...	lbs.	8,432	252	—	8,684
Mtama seed ...	lbs.	—	—	12,419	12,419
Dwarf mtama seed ...	lbs.	2,692	1,265	—	3,957
Pulses ...	lbs.	203	622	—	825
Maize seed ...	lbs.	2,016	1,025	22,500	25,541
Groundnuts ...	lbs.	795	—	—	795
Bambarra groundnuts ...	lbs.	17	—	—	17
Tannia suckers ...	Nos.	9,300	—	—	9,300
Banana suckers ...	Nos.	393	—	—	393

35. Comparative sales of foodstuffs in the Estella Market were as follows:—

	Fish lbs.	Fruit Pakachas.	Vegetables Pakachas.	Staple Starchy Foods Pakachas.
1945 ...	208,162	39,021	48,654	77,675
1946 ...	183,160	65,479	43,581	72,218

Domestic Exports of Agriculture, Forest and Marine Origin.

36. The table below gives particulars of the exports of domestic produce, and has been expanded to include all natural non-mineral products. Cloves and clove and stem oil account for 73.15 per cent of the total value, coconut products 16.81 per cent, and mangrove bark 8.14 per cent, compared with 68.57, 24.98 and 5.02 per cent, for 1945. The rise in the percentage of clove products is entirely due to exports of buds having nearly doubled in quantity. All other exports combined amount to only 1.90 per cent, a sharp reminder of the undiversified economy of the Protectorate.

37. Total domestic exports amounted to some 40,000 tons valued at £1,699,183 as compared with 25,682 tons valued at £1,001,201.

Item.	Unit.	Quantity.	Value £	Per cent of total Value
Cloves	cwts.	310,258	1,159,322	68.22
Clove and stem oil	lbs.	410,677	83,784	4.93
Copra	tons.	8,035	204,113	12.03
Coconuts	Nos.	2,072	10	—
Coconut oil	lbs.	1,354,675	26,222	1.54
Oil cake	cwts.	22,777	13,501	0.80
Soap, common and toilet	cwts.	17,951	41,399	2.44
Mangrove bark	tons.	11,698	138,211	8.14
Chillies	cwts.	84	498	0.03
Fruit, fresh	—	—	10,294	0.60
Beche de mer	cwts.	1,365	2,559	0.15
Tobacco, unmanufactured	lbs.	109,082	2,727	0.16
Ox hides	cwts.	832	3,428	0.20
Skins, sheep and goats	Nos.	16,147	1,067	0.06
Livestock	Nos.	208	47	—
Forest products	—	—	1,521	0.08
Fibres, manufactured	cwts.	317	545	0.03
Shells, marine	—	3,622	8,017	0.47
Other exports	lbs.	4,539	1,918	0.12
			1,699,183	100.00

SECTION II.

WORK OF THE DEPARTMENT OF AGRICULTURE.

General.

38. *Staff.*—Mr. R. O. Williams, O.B.E., Director of Agriculture, was appointed Acting Secretary-Manager, Clove Growers Association, as from 1st October, 1946, and Mr. O. S. Swainson, Senior Agricultural Officer, as Acting Director of Agriculture, from the same date. Mr. J. E. Baker, Agricultural Officer, continued to act for Mr. I. G. C. Squire, Manager of Plantations, until his return from leave on 17th August, 1946. Mr. F. B. Wilson, M.B.E., Agricultural Officer, proceeded on leave on 19th March, 1946, and on his return on 9th December, was posted to Pemba where he relieved Mr. G. E. Tidbury, Agricultural Officer, when he proceeded on leave on 4th November; Mr. L. W. Raymond, Government Chemist, remained seconded to the Secretariat until 19th March, when he proceeded on leave prior to retirement. Mr. A. C. E. Callan, Inspector of Produce, was on duty throughout the year. The Director continued to undertake the functions of Food Controller and is a member of the Economic Control Board, and of the Legislative Council. Mr. Williams continued to be a member of His Highness' Executive Council throughout the year.

39. *School gardens.*—The Department continues to assist in the supervision of school gardens, but with one outstanding exception their progress continues to be slow and uncertain.

Experience in other countries indicates that the only real remedy for this is, by courses of training or other means, to instil real enthusiasm for this work into the teachers themselves.

40. *Compost manufacture.*—1,064 tons of compost were manufactured during the year which, together with 41 tons carried over from 1945, made 1,105 tons available for disposal.

Sales were 469 tons and free issues 145 tons, a total of 614 tons, leaving a balance of 450 tons at the end of the year.

Sales were fairly well up to average, but free issues were much reduced by the reduction of interest in the Marhubi vegetable gardens.

41. *Distribution of plants and seeds.*—The Department continued to assist vegetable growers by maintaining a stock of seed for sale.

In future this will be left to normal private enterprise as before the war except that a certain amount of locally produced seed will be available as an offshoot of the testing of vegetables at Kizimbani.

Apart from vegetables and planting material for food crops the following planting material was distributed during the year:—

		Kizimbani.	Pemba.	Total.
Budded orange	Nos.	887	223	1,110
Budded grapefruit	Nos.	53	—	53
Budded pomelo	Nos.	47	—	47
Budded mandarin	Nos.	27	—	27
Marcotted litchi	Nos.	44	21	65
Marcotted mangoes	Nos.	—	6	6
Grafted mangoes	Nos.	28	—	28
Soursop seedlings	Nos.	52	20	72
Durian seedlings	Nos.	119	25	144
Avocado pear seedlings	Nos.	49	15	64
Rambutan seedlings	Nos.	251	50	301
Carambola seedlings	Nos.	35	20	55
Chinese guava seedlings	Nos.	74	10	84
Sapodilla seedlings	Nos.	37	15	52
Nutmeg seedlings	Nos.	27	13	40
Coffee seedlings	Nos.	—	330	330
Pineapple suckers	Nos.	6,556	—	6,556
Eugenia uniflora (rooted cuttings)	Nos.	20	—	20
Eugenia aquea	Nos.	18	—	18
Eugenia javanica	Nos.	10	—	10
Pawpaw seed	lbs.	2	—	2
Chillie seed	lbs.	12	—	12
Calapogonium	lbs.	2	—	2
Crotalaria	lbs.	476	—	476
Pueraria	lbs.	1	—	1

42. *Clove regeneration.*—The Clove Regeneration Scheme continues to work satisfactorily, the only important change being that the Government Free Nurseries became a charge against the Development Programme as from 1st April.

In addition the Board of the Clove Growers Association agreed, in view of the damage done by the drought, to continue to make financial provision for two nurseries in Pemba.

The following seedlings were distributed during the year:—

	Zanzibar	Pemba.	Total.
Government subsidised for sale	67,100	42,837	109,937
C.G.A. and C.D. & W.F. subsidized free distribution	76,450	41,895	108,345
	133,550	84,732	218,282

43. The programme for 1947 distribution is subdivided as follows:—

	Zanzibar.	Pemba.	Total.
Government subsidised for sale	70,000	60,000	130,000
Colonial Development and Welfare subsidised for free distribution	70,000	30,000	100,000
C.G.A. subsidised for free distribution	30,000	20,000	50,000
	170,000	110,000	280,000

It is estimated that 185,154 seedlings in Zanzibar and 88,000 in Pemba were available in the nurseries at the end of December.

44. Owing to there being practically no vuli crop in Zanzibar in 1945 approximately 123,000 seeds had to be obtained from Pemba.

Government Plantations.

45. From the summarised statement (Appendix I) at the end of the report it will be seen that there was a loss of approximately Shs. 8,720 on the year's working. Revenue, largely owing to the clove crop, increased by approximately Shs. 47,000 compared with 1945, and normal expenditure only increased by some Shs. 3,000. The inclusion of Cost of Living Allowance, previously paid under another Head, added Shs. 46,000 to the expenditure total.

As these figures include the full salary and cost of living allowance of the Manager, who spends a part of his time on other work, they can be regarded as not unsatisfactory.

46. Appendix II gives an analysis of the expenditure and revenue of the four main plantations. They do not in this case include the salary and cost of living allowance of the Manager and headquarters staff.

As regards the loss on Selem the planting of a substantial area of cocoa and extensive regeneration of cloves should be taken into account.

Clove poles from Kidichi and Selem are supplied to other departments of Government free of charge except for the cost of cutting.

47. The numbers of coconuts harvested during the year was well above average, but size was much below normal, 7,000 nuts being required to make a ton of copra compared with an average of about 6,400.

During the year 2,714,272 nuts were dealt with as follows:—

	Nuts.		Nuts.
Brought forward	34,644	Made into copra	2,013,755
Gathered	2,674,762	Sold on the heap	477,737
Collected by patrols	4,866	Used for seed	10,000
		Unsaleable	19,345
		Carried forward	193,435
	2,714,272		2,714,272

The average net price realised per 1,000 nuts during the past four years is as follows:—

1943.	1944.	1945.	1946
Shs. 34/95	Shs. 40/85	Shs. 45/62	Shs. 55/37

48. Copra made during the same period and average prices realised are given below:—

	1943.	1944.	1945.	1946.
Tons of copra	342	306	343	287
Average price per ton	Shs. 287/50	Shs. 317/00	Shs. 349/50	Shs. 460/00

The decrease in the quantity of copra made during the current year was chiefly due to a reduction in kiln capacity owing to a large kiln being destroyed by fire at the end of 1945. One sand bath and two Ceylon type kilns have since been constructed to replace this.

49. It is interesting to note that, whereas copra prices rose from Shs. 20 to Shs. 24/29 per 100 lbs. during the year, there was no appreciable rise in the price of nuts per 1,000. This is entirely due to the abnormally small size of nuts.

50. During the rains 9,540 clove seedlings were transplanted to the field as follows:—

		Sites.	Seedling.
Old clove areas	...	1,064	2,128
Regeneration areas	...	3,706	7,412
New areas	...	—	—

In Pemba all gaps in plantations controlled by the department were filled.

1,237 coconut seedlings were planted and 2,200 sold, the latter at Shs. 8 per 100, increased to Shs. 10 per 100 as a result of the increase in prices of coconuts.

51. Cloves and stems harvested during the past two seasons have been as follows:—

	Green Cloves lbs.	Dry Cloves lbs.	Dry Stems lbs.	Average Price per 100 lbs. Dry cloves.
1945-46 ...	3,747	1,185	342	Shs. 51/25
1946-47 (picking ceased in February, 1947) ...	273,692	87,032	24,368	Shs. 52/28

52. At Selem two acres of old clove land with the dead trees still standing were planted with 2,209 cocoa seedlings during July and August, followed by 493 seeds planted at stake in November and December. The seedlings have made astonishingly good growth and the earlier planted seed produced quite a good stand.

At Langoni 756 seedlings were planted in old clove land bare of trees. Growth here has not been quite so satisfactory.

Experimental Stations.

53. The drainage and irrigation projected at Kinuni cha Moshi was improved by the construction of a mile long irrigation channel from the head of the Mwera river along the west of the reclaimed area. Pipes have been installed to lead off water to the paddy fields and a spillway constructed to dispose of surplus water without damage by wash. The supply of water will not be sufficient for extensive dry weather irrigation but it will be of the greatest use in maintaining the water level on the rice lands after the heavy rains are over.

54. The collaboration between the Agricultural Officer, Kizimbani, and the Superintendent of Prisons as a Board of Management for the land farmed by the Prisons Camps at Langoni and Kinuni cha Moshi continued to give most satisfactory results.

The rice crops were badly affected by dry weather, but in spite of this over 200 bags of cleaned paddy were obtained.

After the rice harvest a considerable amount of levelling was undertaken, together with additional bunding to conserve rain water.

The variety of different crops grown during the inter-cropping season was extended by planting white haricot beans, cluster beans, and bambarra groundnuts as food crops and *Crotalaria juncea* as a green manure.

55. A No. 2 Planters Mill, rice hulling unit, together with the necessary power plant, was purchased locally. A number of small units are also on order from the United Kingdom.

56. A house for the District Agricultural Officer was erected during the year, together with quarters for two Assistant Agricultural Officers, four Overseers, and two blocks of two quarters each for married pupils. In addition the model village was extended by the addition of two further blocks of semi-detached married quarters, as also a small coffee shop. A mosque has been erected by private subscriptions and Government has donated a small coconut plantation to the Wakf Commissioner for its upkeep.

57. The constructional work is a considerable tax on the supervisory resources of the station, but there is no doubt that handsome dividends will be paid in contentment, health, and increased efficiency, as well as a much reduced cost of upkeep compared to that of the former dilapidated quarters.

58. During the year there were five first-year, two third-year and one special pupil in training at Kizimbani.

The school was under the direct charge of an Assistant Agricultural Officer, while the Assistant Veterinary Officer and all the more Senior Agricultural Instructors assisted with instruction in their various sections.

Lectures on Garden and Nursery Work were also given by the Director of Agriculture and the Agricultural Officer, Kizimbani.

59. During the latter part of 1945 the syllabus was throughly overhauled at the instance of Sir Guy Pilling, K.C.M.G., the then British Resident, and the following course of instruction was approved as a basis for 1946 and future years' teaching:—

		Major Subjects.	*Minor Subjects.*
First Year	...	Crop Husbandry. Elementary Botany. Animal Husbandry, and Elementary Veterinary Science.	Elementary Chemistry, and Soils.
Second Year	...	Animal Husbandry and Dairying. Crop Husbandry and Hygiene. Poultry Husbandry.	Agricultural Botany. Elementary Surveying.
Third Year	...	The Clove tree. Estate Book-keeping and Management. Grading and Marketing.	Silviculture. Field Experiments. Hygiene and Sanitation. Recording and Statistical Methods.

All pupils were attached for practical training to different section of the Experimental Station in rotation.

60. Visits to the station included the honour of a visit by H.H. The Sultan Sir Seyyid Khalifa, G.C.M.G. His Excellency Sir Vincent Glenday, K.C.M.G., paid a visit to the station soon after his arrival in the Protectorate, and His Excellency the Acting British Resident, Major E. A. T. Dutton, C.M.G., C.B.E., visited the station on several occasions.

61. *Cloves.*—The 1946 clove crop has turned out to be a heavy one. The mwaka crop was very light but there was a heavy vuli crop and picking was not finished until towards the end of February.

Two manurial seed trials were completed at the end of the year and the results in the fourth and last year indicated for the first time that nitrogenous manures have produced an increase in the weights of the plants.

62. In the Artificial Manuring of Clove Seedlings Trial on Block KBB the young seedlings are rather less luxurious than in the past, probably owing both to dry weather and the fact that growth had concentrated on the production of reproductive rather than vegetative shoots. The pueraria planted in 1945 has made excellent growth and completely dominated weeds, including imperta grass.

Two applications of manure were made, in January and June. The failure of the plants to respond to phosphates in the past led to a decision to apply neutral silicophosphate instead of superphosphate. This change will not take effect until 1947.

Picking commenced in October and was completed by the middle of January. Yields are shewn below.

TABLE I.

Treatment.	Total Number of Surviving Trees in Four Blocks.	Total Yields in lbs. of Green Cloves.	Average Yield per Tree.
Control ...	44	922.7	21.0
N ...	42	988.6	23.5
P ...	52	844.4	16.2
K ...	45	787.1	17.5
NP ...	40	938.1	23.5
NK ...	38	859.1	22.6
PK ...	42	1070.1	25.5
NPK ...	47	1206.1	25.7
Total and Average ...	350	7616.3	21.8

It appears from Table I that the effect of nitrogen has not been so marked as in previous years, and the high yield from the P.K. plots is somewhat surprising.

Measurements of girth and height and estimations of the canopy of all trees were taken in June, and from these figures the averages of the trees in each treatment have been calculated and recorded in Table II.

TABLE II.

Treatment.	Average Girth of trees in inches.	Average Height of trees in feet.	Average Canopy of Trees : 8 represents a full canopy.
Control ...	17.2	17.4	4.77
N ...	16.9	18.1	4.93
P ...	17.6	17.7	4.79
K ...	18.2	18.3	5.18
NP ...	17.3	17.6	4.65
NK ...	18.6	18.2	5.34
PK ...	18.2	18.4	4.79
NPK ...	17.2	17.7	4.81
	17.6	17.9	4.90

From a superficial examination it appears that applications of potash may have resulted in increased tree growth.

63. In the Application of Coconut Meal and Sulphate of Ammonia to Clove Saplings Trial, the first experiment consists of 7 blocks of saplings to which annual dressings of three levels of sulphate of ammonia and three

levels of coconut mashudu are applied in the nine possible combinations. Sulphate of ammonia has produced a significant increase in yield, see Table III below:—

TABLE III.

Sulphate of Ammonia.	Coconut Meal. 0 lb. meal. lbs. green cloves per tree.	12 lbs. meal. lbs. green cloves per tree.	25 lbs. meal lbs. green cloves per tree.	Total yield in lbs. per tree for each rate of application of sulphate of ammonia.
0 lb. per tree ...	6.11	6.37	5.60	6.03
½ lb. per tree ...	10.06	6.37	11.10	9.36
1 lb. per tree ...	9.45	9.85	8.15	9.15
Total yield in lbs. per tree for each rate of application of coconut meal ...	8.54	7.71	8.29	8.18

In the second experiment coconut meal is applied in eight different ways to clove saplings planted in 1939. There are four blocks of trees, each block containing eight plots of eighteen trees each. In 1946, the trees produced their second crop, which was very small.

Yields were as follows:—

Treatment.	Yield in lbs. green cloves. Per treatment.	Per tree.
No manure	46.7	.83
15 lbs. coconut meal per annum	26.3	.49
30 lbs. coconut meal per annum	38.2	.75
15 lbs. coconut meal per annum (for first 10-12 years only) ...	26.6	.44
30 lbs. coconut meal per annum (for first 10-12 years only) ...	49.2	.95
15 lbs. coconut meal per annum (only after first 10-12 years) ...	36.7	.64
30 lbs. coconut meal per annum (only after first 10-12 years) ...	28.0	.53
Manuring in proportion to previous crop	33.4	.63

64. The Manurial Establishment Trial was terminated at the end of the year and as a result of weighing the remaining plants after drying the following conclusions have been reached:

Trial I. Artificial Manures: Treatments.—Control, N., P., K., NP., NK., PK., NPK.

A. Nitrogen produced a highly significant increase in weight.

B. The nitrogen phosphate reaction gave a significant negative response.

Trial II. Organic and Artificials: Treatments.—No manure. Compost, F.Y.M. Coconut Meal, and Complete Artificials.

A. F.Y.M. was significantly better than all other treatments except coconut meal.

B. Coconut meal was better than compost and no manure.

C. Artificials were better than no manure.

65. In the Regeneration of Cloves under Various Nurse Crops and Shade Trees Experiment, the seedlings continue to show marked differences in growth and those under bananas and gliricidia are much more luxuriant and healthy than in any other plots. Those under fodder cane appear to be the most backward.

In accordance with the programme no measurements of height or girth were made this year.

66. Further leaf samples, from both healthy and sudden death areas, together with samples of cassava, banana, and coconuts were sent to Professor Wallace for analysis, with the result given in the table below:—

TABLE IV.

Index to Sample.	Ash as % Dry Matter.	As % Dry Matter				In parts per Million.			
		CaO	MgO	K_2O	P_2O_5	Fe	Mn	B	Ca/Mn Ratio
I Sudden Death	4.11	0.66	0.35	1.48	0.21	99	1,298	32	5 :1
II Sudden Death	3.90	0.68	0.38	1.45	0.26	70	2,090	24	3.2 :1
III Healthy	5.03	1.15	0.42	1.66	0.37	63	890	36	13 :1
IV Healthy	5.74	1.20	0.53	1.46	0.33	59	638	31	19 :1
V Dieback	4.51	0.84	0.39	1.61	0.31	55	1,428	37	6 :1
VI Dieback	5.61	0.90	0.47	1.71	0.23	66	1,635	30	6 :1
VII N.P.K. Lime	5.75	1.32	0.29	2.11	0.33	79	1,188	20	11 :1
VIII N.P.K.	5.76	1.02	0.30	1.58	0.30	66	2,278	19	4.5 :1
Banana									
Healthy	10.33	2.0	0.44	3.0	0.51	114	1,033	16	20 :1
Samples from diseased area	10.30	1.31	0.41	3.21	0.58	169	1,250	18	10 :1
Cassava									
Healthy	13.27	4.05	0.88	2.70	0.95	62	383	46	106 :1
Samples from diseased area	9.25	2.0	0.75	2.51	0.69	86	564	58	35 :1
Coconut									
Healthy	6.97	1.12	0.72	1.30	0.70	68	195	28	57 :1
Samples from diseased area	7.02	0.76	0.75	1.25	0.82	40	505	22	15 :1
Healthy Coconut leaves from Jamaica for comparison.									
Young leaves	5.52	1.16	0.63	2.46	0.51	87	53	15	219 :1
Inflorescence leaves	6.13	1.44	0.56	1.76	0.54	111	98	17	147 :1

It would be premature to comment on these very interesting figures, but among other things the increase in the manganese content of the leaves of healthy trees caused by the application of artificial manures without lime is noteworthy.

67. Several hundred cuttings of cloves were planted, with varying conditions and treatments, in closed propagators to see if they would produce roots.

Only one cutting has so far been successfully potted up but several have shewn signs of callusing. It was found that young terminal shoots with a heel were most likely to produce calli.

68. Only two of the six cloves grafted on guava stocks are living and of these one only appears really healthy.

69. *Coconuts.*—Partly as a result of the high mortality among clove trees either from drought or sudden death, and partly as a result of the enhanced prices for copra and coconut oil, there is a marked revival of interest in the growing of coconuts, and many trees are being planted on land which appears to be badly in need of soil drainage.

70. The Coconut Manurial Trial has now been running for three seasons, and the results are still quite inconclusive. The following table gives the yields for each treatment over the period of the experiment:—

TABLE V.

Treatment.	Total Yields of Nuts. 1946.	Bearing Palms.	Yields of Nuts per Palm. 1944.	1945.	1946.
Coconut meal ...	1,140	33	31	37	35
Artificial (N+K) ...	577	36	29	35	16
Coconut meal+ Artificials ...	1,030	33	32	31	31
No manure ...	1,187	31	36	35	38

Rather surprisingly there is no significant difference between any of the 1946 yields.

71. *Citrus.*—Yields from the orange plot at Kizimbani were reasonably good. The main crop was harvested during July but picking was continuous from May to December.

The table below gives yields for the past five years:—

TABLE VI.

Year.	Number of Bearing Trees.	No. of Oranges.	Average No. of Oranges per Tree.
1942 ...	370	23,259	62
1943 ...	401	203,289	506
1944 ...	337	11,855	52
1945 ...	312	81,644	261
1946 ...	331	63,349	191
Average ...	350	76,679	219

Testing of quality for flavour, size and shape of fruit, number of seeds per fruit, thickness and colour of skin, and juiciness was continued throughout the year, but it appears that the variation between seasons tends to make the year to year results rather conflicting.

72. All stocks budded in 1945 and early 1946 continued to make excellent growth and the largest of them were ready for distribution by the end of the year.

About 15,000 rough lemon seeds were planted during 1946 to provide stocks for budding in 1947.

Ten budded Marsh grapefruit trees and five budded mandarins were planted at the nursery to provide a readily available source of budwood for future work.

73. *Pineapples.*—Experimental work on Smooth Cayenne pineapples has now terminated as the variety was unsuitably shaped for canning and appeared to be very susceptible to a rot which possibly originated in insect damage.

The Californian Red variety was introduced for trial during the year.

74. *Bananas.*—The plot of bananas and plantains established during 1944 continues to flourish and produce large bunches of good quality fruit.

75. During the year it was decided to plant up as complete a collection as possible of all local banana and plantain varieties, and so far the following twenty-five types have been established:

Plantain types.

Mkono wa tembo
Mainyori
Mzuzu
Mchinja damu
Kichaange.

Moko types.

Koroboi miraba
Koroboi chuku (Muscat nyeusi)
Koroboi type (Muscat nyeupe)

Other types.

Mzungu mweupe
Mzungu mwekundu
Mhalihali
Mjenga
Mlali maua
Paka
Paji
Sikuzani
Pukute
Kikonde
Kijakazi
Mtwike
Kiguruwe
Kisukari
Pukusa
Kikonde (ex Kenya)
China.

There are possibly other varieties in Zanzibar and certainly one, mficha chana, in Pemba.

76. It is apparent that some varieties do much better than others under certain conditions, and for this reason the moko types grow most commonly in the drier districts of Zanzibar and Pemba.

77. In Pemba the question arose during the year as to the extent to which bananas were responsible for mosquito breeding in township areas. This was of considerable importance as the enforced cutting out of bananas and plantains would have caused hardship at a time when food was scarce in any event.

This led to an investigation extending over both rainy seasons in which 22,000 banana plants were examined with the result that only 190 larvæ were found in four varieties:—

	Culex found.	Stegomaya found.
Mkono wa tembo ...	96	19
Mzuzu ...	45	22
Bokoboko ...	1	5
Kiguruwe ...	—	—
	142	46

Ten other varieties were never found to harbour larvæ and in none of the above cases were anopheles larvæ found.

78. *Kapok.*—The four kapok blocks came into bearing again at the end of the year, but yields have been very variable and on the whole very poor.

The quantities of lint harvested are given below:—

TABLE VII.

Block.	Origin.	Planted.	Yield of lint per tree in lbs. Average. 1941-45.	1946.
A.	Java via Malaya ...	1934	1.75	1.05
B.	Saigon ...	1938	1.25	0.79
C.	Mixed Java and F.M.S. ...	1938	0.97	0.64
D.	Selewak Sewengam ...	1938	2.68	1.01

Yields as low as this render the crop uneconomic.

79. *Oil Palms.*—The extremely dry weather during the latter half of 1945 and the early months of 1946 resulted in a large drop in palm (pericarp) oil production.

The following is a table of comparative production:—

TABLE VIII.

		1942.	1943.	1944.	1945.	1946.
Palms	No.	362	362	360	339	339
Bunches harvested	No.	1068	704	1050	1230	1093
Average Weight per Bunch	lb.	15.8	21.9	30.5	29.3	25.3
Heaviest Bunch	lb.	48	58	76	68	80
Average Weight Fruit per Bunch	lb.	10.5	16.7	26.0	19.0	16.2
Average Weight Oil per Bunch	lb.	1.01	1.24	2.1	1.8	1.45
Average Weight Oil per palm	lb.	—	—	6.4	6.2	4.69
Oil per 100 lbs. fruit	lb.	6.49	7.52	6.40	9.37	8.96
Weight of oil prepared	lbs.	728	871	1,747	2,293	1,588

The following table gives the variation in yield of bunches, weight of fruit per bunch, and in the percentage of oil extracted during every month of 1946:—

TABLE IX.

	No. of bunches harvested.	lbs. fruit per bunch.	Weight oil Extracted per bunch.	Percentage Oil extracted to fruit.
January ...	39	15.1	1.49	9.99
February ...	59	18.1	1.50	8.27
March ...	120	19.8	1.94	9.79
April ...	81	20.5	2.04	9.91
May ...	178	17.8	1.52	8.56
June ...	126	16.2	1.25	7.73
July ...	156	18.3	1.54	8.43
August ...	90	14.9	1.41	9.48
September ...	75	12.7	0.93	7.32
October ...	50	8.0	0.96	12.00
November ...	83	9.9	1.14	11.55
December ...	36	12.5	0.97	7.79

It is noticed that a higher percentage of oil is extracted from small bunches than larger ones. It is believed that this may be due to the fact that the small bunches ripen more evenly and that a larger number of the pericarps are in the optimum condition for expression.

80. Crows have been a serious pest, carrying away a considerable number of fruits and destroying others. 120 have been killed during the year.

81. *Cocoa.*—The old trees on the Dunga plot are looking reasonably well, but the seedlings planted to fill gaps are making rather disappointing growth.

The number of pods picked during the year is shown below:—

TABLE X.

	No. of Pods Harvested.	
	1945.	1946.
January ...	Not picked	298
February ...	,,	26
March ...	,,	29
April ...	,,	29
May ...	,,	94
June ...	,,	4
July ...	,,	—
August ...	17	—
September ...	14	—
October ...	13	148
November ...	47	150
December ...	59	976
	150	1,754

82. The eight Forastero type trees at Kinuni cha Moshi only yielded 319 pods as against an average of 493 for the last four years. This was probably due to unfavourable weather conditions. The pods on most of the trees were exceptionally large.

83. The five-acre plot reserved for cacao planting at Kizimbani was planted with 3,018 Java Criollo type seedlings from Dunga during the months of April and May. Half the field was spaced at 8′ × 8′ and half at 10′ × 10′.

The weather during planting was not very favourable, dry spells hindering establishment. The seedlings were also unavoidably variable, some being well grown ones from clay pots and others direct from the nursery and rather on the small side.

84. Insect attack was severe, both from Chrysomelid beetles which eat holes in the leaves and weevils which feed on the leaf margins. In the autumn spraying with paris green was adopted as a remedy, but was not very efficacious and appeared to be damaging the foliage. As a result hand picking was started in December.

85. Attempts to encourage growth included small dressings of sulphate of ammonia, coconut meal, and compost, and by the end of the year most seedlings were showing some improvement and producing a small new flush of leaves.

86. General progress, however, compared very unfavourably with the results at Selem, mentioned in paragraph 52 of this report.

87. 1,790 Criollo seedlings in all were distributed free to private growers for trial. These not unnaturally received widely differing treatment according to the personal interest taken in each case but at the end of the year some 1,300 were alive and growing with varying degrees of promise.

88. It is too early to generalize as yet, but it appears that both growth and survival rates have been best on the lighter soils.

89. In Pemba seed from two trees of *Porcelaino criollo* planted many years ago at Bule, named for the sake of clarity, Bule 2 and Bule 3, was grown in a nursery at Mgogoni and 288 subsequently planted at Limbani and 120 at Matangatwani. By the end of the year both plots had made good progress, especially that at Matangatwani. It is noticeable at Limbani that seedlings grown under the partial shade of old clove trees did better than any others.

90. All the seed produced at Dunga, amounting to 11,654, was planted at the nursery, and from this 8,727 seedlings were produced and sent out for planting.

These were distributed as follows, the figures including replacements:—

Kizimbani	...	4,131
Selem and Langoni	...	2,634
Dunga replacements	...	140
Private growers	...	1,790
Langoni prison	...	32
		8,727

In addition, the Manager of Plantations was supplied with and planted 433 seedlings of Bule 3, 23 of Bule 2, and 40 of Bule mixed, a total of 496, and a grand seedling total of 9,223.

91. The large Dunga 1946-47 crop necessitated a very great increase in nursery work, and by the end of December 32,522 seeds had already been planted, and more than 250 pods, equivalent to about 7,500 seeds, are expected to be reaped in January and February. In addition 200 pods were sent to Pemba and 75 to Selem. From the Kizimbani nurseries alone there will be nearly 20,000 seedlings available for distribution in 1947.

92. Several batches of cacao cuttings of the Criollo variety were put into the propagator, but of 65 cuttings only three produced roots. Two of these are doing well.

93. After a demonstration on patch budding technique attempts were made to bud Criollo cacao on to Forastero stocks. These were highly successful, about 60 per cent success being achieved, and 166 budded plants were produced. Thirty-six of these have been planted out in the field and are growing luxuriantly.

94. *Coffee.*—The coffee blocks at Kizimbani were all adversely affected by the dry weather during the first few months of the year. This equally applied to the small block at Mkwajuni and privately owned coffee.

95. The Liberica block recovered very slowly and on examination it was found that it was defoliated by *Hemelia vastatrix*. This is the first record of the fungus in Zanzibar. Later it was also seen at Kitope, Mwera, and Kwambani.

96. The yields of the various plots are given below:—

TABLE XI.

Block.	Variety.	Planted	Yield in lb. of fresh berries.				
			1942	1943	1944	1945	1946
B	Excelsa	1929	116	380	278	952	889
D	Liberica	1938	568	962	820	868	2,130

The excelsa crop was from 175 trees, and the Liberica crop from 256 trees, giving a yield of 5 lbs. and 8.3 lbs. per tree respectively. The robusta plot has been discontinued as a result of complete failures to crop over a period of five years.

97. *Chillies.*—The seedlings from the imported chillies found growing at Paje have borne well. From the 1/12th acre plot 168.6 lbs. of fresh chillies, equivalent to 70.8 lbs. of dry chillies, were harvested, a yield per acre of 850 lbs. of dry chillies.

98. *Derris.*—The world demand for derris as an insecticide continues and the available planting material is being multiplied with a view to establishing a peasant industry.

Three recent consignments have shown an 8.7, 6.3, and 6.5 per cent rotenone content respectively.

99. *Pawpaw.*—Regular tapping of the one Hawaian and two local varieties of pawpaw, which was commenced towards the end of the year, has indicated that the Hawaian variety gives approximately twice as much juice as the local ones. It has the further advantage of being a rather dwarfed type and thus easier to tap.

A small quantity of excellent quality papain was produced during the year.

100. Among green manure and cover crops grown at Kizimbani, *Pueraria phaseoloides*—previously thought to be *P. thumbergiana*—has been particularly successful as a vigorous grower for several seasons. Seed is usually a difficulty with this crop but it is of interest to record that it seeded twice during the year and about 12 lbs. were collected.

101. *Rice.*—As already stated in paragraph 30, 1946 was an extremely poor season for rice. At Kizimbani it was impossible to transplant seedlings until 29th March, by which time many were too old to tiller properly after transplanting.

At Langoni, where irrigation was possible, quite fair yields were obtained, but at Kinuni cha Moshi, where the main canal had not yet been completed, it was impossible to provide the growing crop with sufficient water, and yields were very poor.

102. Eight of the better varieties were included in a trial under swamp conditions at Langoni. The yields obtained are given below:—

TABLE XII.

Variety.	Yield in lb. of paddy per acre.
Mgazija	2,839
Cheche No. 117 ...	2,693
Malikora No. 7 ...	2,652
Malikora No. 9 ...	2,652
Kisukari No. 86 ...	2,640
Afaa No. 58 ...	2,614
Kibawa No. 158 ...	2,328
Mtoto wa Malikora No. 24	1,648

Owing possibly to soil variations none of the above differences are significant.

103. In the Rice Spacing Trial at Langoni yields were as follows:—

TABLE XIII.

Spacing.	Yield in lbs. paddy per acre.	No. of Plants per acre.
4″× 4″ ...	2,834	392,040
6″× 6″ ...	2,733	174,240
8″×8″ ...	2,077	98,010
10″×10″ ...	1,960	62,726

The yields show the same trend as other spacing experiments in recent years, but none of the differences were significant.

104. Using 1945 and 1946 figures, and taking a spacing of 8″ × 8″ as standard, Tables XIII and XIV compare the increase in yield obtained from closer spacing with the additional number of seedlings required to produce that increase.

TABLE XIV.

Spacing in Inches	Seedling required in excess of 98,010.	1945 Yield in excess of 1,226 lbs.	1946 Yield in excess of 2,077 lbs.
8×8 ...	0	0	0
7×7 ...	30,003	230	—
6×6 ...	76,230	286	656
5×5 ...	152,896	409	—
4×4 ...	294,030	661	757

It will be seen from the 1945 yields that in planting an acre at a spacing of 4″ × 4″, as much seed would be required as to plant up four acres at an 8″ × 8″ spacing. The increase in yield by planting at 4″ × 4″ is 661 lbs. of paddy whereas if the same amount of seed was planted in 4 acres the yield would be 1,316 × 4 lbs. an increase of 3,948 lbs. It is obvious from the above that, when seed supplies are short and plenty of land is available, wide spacing is much preferable to close spacing. When land is scarce and seed plentiful a closer spacing will increase yields, but at the cost of extra expense in seed, planting, and where applicable, transplanting.

105. In the Lime and Coconut Meal Manurial Experiment the yields in lbs. are summarised in the following table:—

TABLE XV.

	No Lime.	5 tons Lime.	Total	Total as lbs. per acre.
No Meal ...	73.5	65.3	138.8	2,191
½ ton Meal ...	96.1	89.5	185.6	2,929
1 ton Meal ...	88.3	85.6	183.9	2,902
Total ...	257.9	250.4		
Equivalent to lbs. per acre ...	2,714	2,635		

It is obvious that there was no significant difference in yield due to the lime application, but both coconut meal treatments were significant at P=0.05.

106. The first of the Rice Rotational Cropping Trials mentioned in paragraph 79 of my 1945 report and laid down on 4 plots in Zanzibar and one in Pemba, was a failure owing to unfavourable weather.

107. The results of the second similar trial laid down at Kinuni cha Moshi were as follows:—

TABLE XVI.

Treatment.	Yields in lb. per acre.
Ridging only	... 828
Green Gram and Cowpeas on ridges	... 713
Green Gram and Cowpeas on flat	... 592
Weeds (control) on flat ...	... 581
Sweet Potatoes on ridges ...	... 567

Statistical analysis shows that ridging only is highly significantly better than sweet potatoes on ridges and the control treatment at P=0.01, and significantly better than pulses on the flat at P=0.05.

108. The multiplication of varieties was continued to produce seed for distribution and for further trials. Four new varieties, Guiana Creole and Guiana 79 from Nigeria, G.E.B. 24 from Madras, and Nondo, collected locally, were sown for the first time:—

TABLE XVII.

Variety.	Where grown.	Approximate area in sq. yds.	Yield in lb. per acre.
Guiana Creole	Langoni	100	1,335
Guiana 79	,,	100	1,681
G.E.B. 24	,,	100	1,381
Nondo	,,	100	1,162
Afaa No. 50	,,	2,100	2,231
Afaa	,,	720	1,136
Mgazija	,,	5,781	1,739
Sokotera	,,	809	2,585
Sokotera	Kinuni Moshi	13,500	575
Mgazija	,, ,,	13,908	561
N. 14	,, ,,	125	1,897
Moshi	,, ,,	2,520	955
Mtoto wa Malikora	,, ,,	1,432	642
Shingo ya Mjane	,, ,,	1,408	564
Waya	,, ,,	644	781
Kisukari	,, ,,	743	1,210

109. *Sorghum.*—The variety known as Dwarf Hegari, from the coastal area of Kenya, was again planted fairly extensively, and yields of 52, 308, and 382 lbs. per acre were obtained. This variety, though not a heavy yielder, has the advantage of being able to mature in between 2½ and 4 months, and of not being attacked by birds. The seed appears to be particularly susceptible to weevil attack during storage.

110. *Cassava.*—A variety trial laid down to compare the yields of Kizimbani seedlings with the variety Msitu had to be abandoned owing to failure to attain a sufficiently good stand. Seeds of the Msitu variety are again being collected in an effort to find a seedling variety better than Msitu itself.

Ten new varieties of cassava were received from Amani in 1946 and planted. On the whole they have not done very well and some have been affected by mosaic.

111. *Soya Beans.*—Four varieties of soya beans were received from Uganda and planted in the nursery, the seed being first inoculated with a suspension of the nodule bacterium in milk.

Of these Hermon 49 appeared to make the best growth but, partially owing to many of the seeds having rotted in the pods, the yield was poor. This may have been due to damage by sucking bugs, which are a serious pest of pulses in Zanzibar.

112. Work on the testing of vegetables and the local production of seed continues. Vegetable production during the hot season remains a problem to which there is probably no complete solution.

Veterinary and Animal Husbandry.

113. *Livestock diseases.*—The health of the cattle population has again remained good apart from enzootic east coast fever and, in Zanzibar only, trypanosomiasis.

114. In the Mangapwani area there have been rather a large number of cases of trypanosomiasis treated, but this is probably due to the more general desire for treatment and not to any increase in the incidence of the disease. Phenanthridinium has here been used with great success.

115. There is a suspicion that contagious abortion may be present in Zanzibar, at any rate at Mtoni, but no case has as yet been definitely confirmed.

116. Anti-tsetse clearing has been carried out in the Chukwani area, where a grazing scheme for the surplus population from the Mtoni dairies has been planned. Pending further expert advice it is not yet, however, possible to draw up a comprehensive scheme of eradication or control for the whole of Zanzibar.

117. A considerable amount of work on the Chukwani Grazing Scheme, which covers a potential area of 850 acres, has already been completed, including the construction and improvement of wells and the erection of fencing posts for 350 acres. Completion of the work awaits the arrival of wire for fencing.

118. The fencing round the Marhubi quarantine area also awaits the arrival of wire.

119. During the year the Public Works Department completed the new drainage scheme for the Mtoni Dairies and carried out improvements and alterations to six of the existing dairy units. It is hoped that it will be possible to undertake similar work on the other six units during 1947.

120. The same epidemic as in November, 1945, now diagnosed as Newcastle virus, carried off all the remaining birds at Kizimbani in September. Two pure Rhode Island cockerels have been imported from Kenya to start the building up of a new flock, and sittings of both Rhode Island and Australorp breeds were procured from Pemba and Kenya respectively for the same purpose.

121. Fortunately the Pemba unit escaped the disease, though there were outbreaks throughout the island. 2,575 eggs were sold to the public for setting.

122. A comprehensive cattle census has been put in hand and that in Matangatwani Mudiria has already been completed. Preliminary figures indicate that the excessive slaughter of female cattle which was the rule some years ago has now been checked.

123. Mr. Ahmed Rashid, Assistant Veterinary Officer, proceeded to the Royal (Dick) Veterinary College, Edinburgh, to qualify as a Veterinary Surgeon under the Nuffield Scheme.

124. 1,999 bovines were examined at the Veterinary laboratory during the year of which 283 were positive for trypanosomiasis, 21 for east coast fever, 18 for anoplasmosis, and 6 for piroplasmosis.

125. 1,738 mammals and 9 birds were treated at the Zanzibar clinic during the year.

126. The following animals were imported from the mainland:—

Oxen	2,177
Cows	117
Calves	72
Goats	9,490
Sheep	1,215
Donkeys	46
Horses	3

127. Animals slaughtered at the Zanzibar abattoir during the year were as follows:—

	Cattle.	Goats.	Sheep.	Calves.
Imported	2,197	9,490	1,000	—
Local	367	1,998	—	19
Total	2,564	11,488	1,000	19

128. Slaughterings of bovines in Pemba, practically all local stock, were as follows:—

	Matanga-wani.	Wete-Piki.	Ziwani	Chake-Chonga.	Mkoani	Total
Districts ...	285	715	209	880	776	2,865
Townships ...	—	300	—	353	63	716
Total ...	285	1,015	209	1,233	839	3,581

Stock Farm.

129. As from the 1st April the former Scheme D.188 was absorbed into the general Scheme D.647.

130. *Cattle.*—The Milk Index, on the same basis as that calculated in previous years, which indicates the average number of pounds of milk given per day for all cows in milk, is as follows, and is compared with the average figures for 1942-45:—

Average.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Whole Year.
1942-45	6.5	6.4	6.3	5.7	5.5	5.5	5.5	5.3	5.8	6.4	7.0	7.0	6.1
1946	7.0	6.0	6.4	6.9	6.3	6.2	6.4	6.4	7.1	6.2	6.0	5.5	6.4

There was a distinct falling off at the end of the year, probably due to the fact that the unpalatable coconut cake was the only concentrate available.

131. Fifty-two calves were born at Kizimbani during the year of which eight died, five of them during the last 10 days of October, a mortality of 15.4 per cent. This increased percentage, which is a good deal higher than that for 1945, was mainly due to the October outbreak of white scour which was ultimately checked by dosing with sodium tellurite.

Live weight gains for all unweaned calves averaged 4.2 lbs.

132. The health of the herd was good, though there were 23 cases of *T. congolense* and one of *T. vivax*. All were treated with phenanthridinium 5897 or, later in the year, S.1553, and all recovered. All the trypanosomiasis cases appeared to be contracted in the Mdo area. In addition, there was one death from east coast fever, one from anaplasmosis, and one from tympanitis.

133. During the year it became necessary, owing to the limited accommodation and the comparative scarcity of grazing, to limit the size of the dairy herd to approximately 30 cows in milk.

This was achieved by discarding and selling for slaughter all cows which had failed to attain certain standards of milk production either in their first or second lactations. Fifteen animals were disposed of in this way, and several more have been earmarked for disposal after they have calved.

134. It has been decided that no cow will be disposed of on her first lactation performance, as, owing to temperament she may fail to let down her milk as a heifer.

Cow No. 111, which gave 37 lbs. of milk in her first lactation, and 2,931 lbs. in her second, illustrates this point.

135. The results of discarding the poorest milkers and the general progress made can be to some extent assessed by the following table, using the pounds of milk per day between calves as a basis for camparison:—

		lb. of Milk per day between calves.				
Native Cattle.	Number of cows.	1st Lactation.	2nd Lactation.	3rd Lactation.	4th Lactation.	5th Lactation.
(a) Without selection ...	45	2.29	—	—	—	—
(b) After partial selection.	23	—	4.19	—	—	—
,, ,, ...	16	—	—	4.55	—	—
,, ,, ...	4	—	—	—	4.61	—
,, ,, ...	2	—	—	—	—	6.50
(c) Present herd ...	17	3.26	—	—	—	—
,, ,, ...	12	—	5.65	—	—	—
,, ,, ...	10	—	—	6.10	—	—
,, ,, ...	4	—	—	—	5.23	—
,, ,, ...	2	—	—	—	—	6.50
First Cross.						
Native X Ngong ...	3	4.72	—	—	—	—
Pure Ngong ...	2	7.56	—	—	—	—
,, ,, ...	1	—	—	—	—	3.73

It will be seen that there is a very definite upward tendency.

136. The improvement in the grazing effected by folding the cattle on a restricted area at night was much assisted by penning goats in the same pasture by day. These animals eat down useless weeds and young shrubs. One Pemba grass pasture which was being choked by weeds now presents almost a pure stand after being treated in this way.

137. *Goats.*—The small herd of 13 goats which was started in 1945 was enlarged in January by the purchase of 3 animals locally and 14 from Tanganyika.

138. At the beginning of March an outbreak of goat pox (*Variola caprina*) occurred among the Tanganyika goats and by the end of the month 33 animals were affected. Although only 5 died from the disease itself, the attack weakened the constitution of many others and more died during the following months. In spite of this the herd was 51 strong in September.

139. Since then, in spite of regular monthly dosing with copper sulphate, a large number of nannies and kids have died following attacks of diarrhœa, and post-mortem examinations have indicated that the chief cause of death has been hæmonchiasis. In seven cases pneumonia set in before death.

140. Some improvement has beeen effected by strict attention to hygiene, but there is little doubt that keeping them in close proximity to cattle increases the chance of worm infection.

Phenothiazine is now being used to replace copper sulphate as an anti-helmintic.

141. *Sheep.*—Five sheep, three of them imported from Somaliland in 1945, the other two being their progeny, were purchased towards the end of the year. Their condition and health is good.

Produce Inspection.

142. The work of Produce Inspection continued to run smoothly and without friction despite the additional work involved in examination of record mangrove bark exports, arrivals of between 5 and 6 lakhs of cloves during the last three months of the year, and the second highest clove exports for the past twenty years.

143. The quantity of cloves passed for export, under the Agricultural Produce (Export) Decree, in their grades, are shown below:—

Inspection and Grading of Cloves prior to Export (1946).

Month.	Grade II Bales.	Grade III Bales.	Total Passed Bales.
January ...	20,686	200	20,886
February ...	26,490	Nil	26,490
March ...	4,387	1,150	5,537
April ...	8,297	1,427	9,724
May ...	4,046	2,150	6,196
June ...	5,516	727	6,243
July ...	27,669	500	28,169
August ...	15,780	100	15,880
September ...	41,642	—	41,642
October ...	20,028	—	20,028
November ...	10,635	—	10,635
December ...	8,814	668	9,482
Total ...	193,990	6,922	200,912

Cloves packed in inspection shed ... 110,853 Bales ... 85%
Cloves packed by Clove Growers Association 90,059 Bales ... 45%

The percentage of Grade III was only 3.5 per cent as compared with 20.6 per cent in 1945.

144. 12,130 tons of mangrove bark and 4 tons of chillies were also examined under the above decree.

145. The results of the examinations of cloves, clove stems, and copra, under the Agricultural Produce (Adulteration) Decree were as follows:—

Examination of Cloves, Clove Stems, and Copra for Adulteration during 1945.

Origin.	Total Deliveries.	Passed.	Failed for: Excessive Moisture.	Extraneous Matter.	% Failures.
CLOVES IN BAGS.					
Zanzibar ...	18,680	17,490	1,021	169	6
Pemba ...	197,100	187,915	8,077	1,108	5
Total ...	215,780	205,405	9,098	1,277	
CLOVE STEMS IN BAGS.					
Zanzibar ...	4,082	3,169	215	298	22
Pemba ...	Nil.	Nil.	Nil.	Nil.	-
COPRA IN BAGS.					
Zanzibar ...	159,315	145,712	11,959	1,644	8
Pemba ...	47,591	47,242	49	300	1
	206,906	192,954	12,008	1,944	

Copra was classified as 79 per cent kiln-dried, 9 per cent smoke-dried, and 12 per cent sun-dried.

146. Comparative produce arrivals for the years 1944 to 1946 were as follows:—

Produce.		1944.	1945.	1946.
Zanzibar cloves	...	60,305	25,879	18,680
Pemba cloves	...	169,203	76,916	197,100
Zanzibar copra	...	174,782	159,634	159,315
Pemba copra	...	63,864	62,894	47,591
Zanzibar stems	...	17,327	16,799	4,082
Pemba stems (Pemba inspection figures)	...	103,520	46,338	56,081

147. Seventy-six samples of clove and stem oil, and 109 samples of coconut oil were forwarded to the Government Chemist for examination. Three samples of clove buds were also tested for moisture.

Chemical Laboratory.

148. The Government Chemist, Mr. L. W. Raymond, continued to be seconded to the Secretariat till 19th March, 1946, when he departed on leave prior to retirement. Mr. A. K. Briant was appointed Acting Government Chemist from the date of proceeding on leave of Mr. Raymond. He reports as follows:—

General Analyses.

The total number of samples received was 675 as against 931 in 1945. Of the 675 samples 658 samples came from various Government departments and 17 from private firms. Fees accruing to the Government for samples analysed for private firms and for certification of clove oil for export amounted to Shs. 262/50.

149. Details of the samples are as follows:—

Agriculture.—Cloves 4, clove stem oil 59, clove bud oil 17, cattle dips 100, waters 19, soils 4, coconut oils 109, flour 2, mangrove barks 2, dog stomach and intestines 2; total 318.

Health and Medical.—Milk 180, waters 4, condensed milk 2, flour 3; total 180.

Police.—Opium 9, bhang 55, milk 10, toxicological exhibits 17, flour 4, liquors 9; total 104.

Customs.—Methylated spirit 4, squashes 15, vinegar 1, Vimto essence 1; total 21.

Public Works.—Waters 10, corroded steel 1; total 11.

Pathologist.—Water 6, liver, etc. 3, stomach contents 2, spinal fluid 1, hydrogen peroxide 1; total 13.

District Commissioner.—Milk 2.

150. Notes on the more important samples:—

Agriculture.—The quality of bud oil and stem oil from the Clove Growers Association distillery remained good throughout the year. The 76 samples examined represented 327,186 lbs. of stem oil and 56,303 lbs. of bud oil, a total of over 171 tons. The eugenol content of all the samples was determined. That of stem oil ranged from 82 to 93.5 per cent and that of bud oil from 88 to 91.5 per cent. The refractive index (at 20°C.) of stem oil varied from 1.5349 to 1.5382.

151. Of the 100 samples of cattle dip examined 27 were of correct arsenical strength, 25 were over, and 48 below strength. The excess of arsenic was 10 per cent or over in 25 cases and the deficiency 10 per cent or more in 42 cases.

152. Out of 109 samples of coconut oil 2 were of edible and 107 of industrial quality. Two samples of industrial quality failed, one for 1.24 per cent moisture, the limit being 1 per cent and the other for 9.32 per cent acidity, the limit being 8.9 per cent.

153. Monthly chemical examinations of the Zanzibar public water supply continued and the results continued to be uniformly good.

The range of analytical figures were as follows:—

		Parts per 100,000 Minimum.	Maximum.
Total solids (dried at 105°C)	...	34.0	35.0
Alkalinity (as calcium carbonate)	...	29.6	30.0
Chlorides (as sodium chloride)	...	2.2	2.4
Nitrogen in free and saline ammonia	...	Nil	0.002
Nitrogen in albuminoid ammonia	...	Nil	0.001
Nitrogen in nitrates	...	0.02	0.03
Nitrogen in nitrites	...	Nil	Nil
Oxygen absorbed from potassium permanganate in 4 hours at 80°F	...	0.0030	0.0036

154. *Health.*—Samples of milk taken again increased from 148 to 180. These can be classified as follows:—

Genuine	...	149
Deficient in solids other than fat	...	26
Deficient in fat and solids other than fat	...	5

The worst sample had a 30 per cent deficiency in fat and a 50 per cent deficiency in solids other than fat. Seven prosecutions resulted and fines up to Shs. 25 were imposed.

155. *Police.*—Opium was identified in eight out of nine exhibits and bhang in all 54 exhibits sent to the Police.

The samples of native liquor all contained more than 3 per cent of alcohol.

Ten samples of milk were also examined for the Police, their deficiency in fat ranging from 33.3 to 71.6 per cent and in solids other than fat from 5.29 to 86.35 per cent.

156. *District Commissioner.*—Two samples of milk from the Makunduchi Mudiria were found to be deficient in solids other than fat to the extent of 11.65 and 19.9 per cent respectively.

157. Samples of fruit squashes and coconut cake were examined. Samples submitted in connection with cargo surveys and insurance claims included sugar, gunny, cloth, wrapping paper, and napthalene balls.

158. The laboratory continued to make certain standard solutions for the Pathologist. The District Administration were issued with 3,700 sodium arsenite baits for poisoning wild pig.

SECTION III.

Legislation.

159. The following legislation was enacted during the year:—

		Date.
Government Notice No. 84	... Date of coming into force of the Woodcutting Decree (No. 18 of 1945) ...	23.3.46
Government Notice No. 85	... Appointment of Licensing Officers under the Woodcutting Decree (No. 18 of 1945) ...	23.3.46
Government Notice No. 86	... Appointment of Inspectors under the Woodcutting Decree (No. 18 of 1945) ...	23.3.46
Government Notice No. 97	... The Woodcutting (Fees and Royalties) Order, 1946 ...	13.4.46
Government Notice No. 98	... The Woodcutting (General) Rules, 1946 ...	13.4.46
Government Notice No. 99	... The Woodcutting (Protection and Control of Chwaka Mangrove Forests) Rules, 1946	13.4.46
Government Notice No. 103	... The Defence (Planting of Bananas) (Pemba) Order, 1946 ...	13.4.46
Government Notice No. 113	... The Defence (Planting of Sweet Potatoes) (Zanzibar) Order, 1946 ...	27.4.46
Decree No. 7 ...	... The Transfer of Agricultural Produce (Amendment) Decree ...	20.6.46
Decree No. 9 ...	... The Land Alienation (Amendment) Decree	20.4.46
Decree No. 11 ...	... The Labour Decree, 1946 ...	20.4.46
Government Notice No. 196	... The Defence (Planting of Sweet Potatoes) Order, 1946 ...	6.7.46
Government Notice No. 205	... The Plantation Workers (Clove Picking Contracts) Regulation, 1946 ...	26.7.46
Government Notice No. 211	... The Plantation Workers (Clove Picking Contracts) Regulation, 1946 ...	20.7.46
Government Notice No. 217	... Declaration of Derris to be produce under the Transfer of Agricultural Produce Decree	3.8.46
Government Notice No. 218	... The Defence (Planting of Sweet Potatoes) (Pemba) Order, 1946 ...	3.8.46
Government Notice No. 292	... The Clove (Minimum Percentage of Exported Cloves) Order, 1946 ...	19.10.46
Government Notice No. 311	... The Defence (Preparation of Rice Land) (Zanzibar) Order, 1946 ...	23.11.46

160. The first six Government Notices relate to rules and orders made under the Woodcutting Decree No. 18 of 1945 which came into force as from 15th April, 1946. The object of this Decree is to control the cutting and removal of wood grown on Government land and to provide for the levying of certain royalties thereon.

161. *Government Notices Nos. 103, 113, 196, 218 and 311* relate to cultivation and planting orders made under the Defence (Land Requisition and Personal Service) Regulations, 1943, with the object of maintaining the production of locally grown foodstuffs.

162. *Decree No. 7 and Government Notice No. 217.*—By Decree No. 7 the Transfer of Agricultural Produce Decree (Cap. 121) is amended by including under the definition of "agricultural produce" any other article which the British Resident may so declare. By Government Notice No. 217 effect is given to the above amendment by declaring derris and cacao as agricultural produce.

163. *Decree No. 9.*—Amends the Land Alienation Decree No. 9 of 1939 and with effect from 1st July makes it illegal to sell or mortgage any land belonging to an Arab or an African for the purpose of paying any debt under the Insolvency Decree, 1917. The object of this amendment is to safeguard agricultural land from falling into the hands of non-agriculturists.

164. *Decree No. 11.*—This Decree repeals the Master and Native Servants Decree (Cap. 129) and provides for more up-to-date legislation including the better control of clove picking contracts.

165. *Government Notices Nos. 207 and 211.*—These notices made under the Labour Decree No. 11 of 1946 refer to regulations regarding the picking of cloves on contract and have the object of safeguarding the interests both of the employer and employee.

166. *Government Notice No. 292.*—This order made under the Clove Decree No. 9 of 1939 reduces the minimum quantity of cloves to be purchased by exporters from the Clove Growers Association from 50 to 10 per cent. This was necessitated owing to the stocks of cloves held by the Clove Growers Association being insufficient to maintain the former percentage.

Acknowledgment.

167. I wish to acknowledge the ready co-operation of the Provincial and District Administrations, especially in matters relating to food production and control.

Finally I am indebted to Mr. O. S. Swainson, Senior Agricultural Officer, for preparing this report during the period he acted as Director of Agriculture.

R. O. WILLIAMS
Director of Agriculture.

Appendix I.

Revenue and Expenditure of Government Plantations.

Revenue.

		Shs.	cts.	Shs.	cts.
Cloves	...	15,860	44		
Coconuts	...	161,339	42		
Miscellaneous	...	4,680	35		
Leased Plantations	...	1,200	00		
		183,080	21		
Less value of produce brought over from 1945		2,138	62		
		180,941	59		
Add value of produce carried over to 1947		14,738	59	195,680	18

Expenditure.

Personal Emoluments	...	32,316	34		
Other Charges	...	126,049	46		
Cost of Living Allowance	...	46,033	55	204,399	35
Expenditure exceeds Revenue by	...			Shs. 8,719	17

Appendix II.

Revenue and Expenditure of Government Plantations.

Revenue.		Kidichi	Selem	Mtoni	Chukwani	Total
Sale of cloves and stems	...	14,020.65	1,643.70	—	—	15,664.44
Lease of clove crops	...	—	—	175.00	21.00	196.00
Sale of copra	...	50,854.96	21,803.18	38,962.09	21,074.90	132,695.13
Sale of coconuts	...	26,371.29	—	66.00	10.00	26,447.29
Lease of coconut crops	...	—	143.00	1,409.00	645.00	2,197.00
Miscellaneous	...	997.10	345.00	3,248.25	90.00	4,680.35
Lease of plantations	...	—	1,200.00	—	—	1,200.00
		92,244.00	25,134.97	43,860.34	21,840.90	183,080.21
Less value of produce brought forward	...	1,884.25	—	—	254.37	2,138.62
		90,359.75	25,134.97	43,860.34	21,586.53	180,941.59
Add value carried forward :						
Cloves	...	5,066.84	—	—	—	5,066.84
Coconuts at 50/- per 1,000	...	5,076.80	1,751.35	1,573.80	1,269.80	9,671.75
Total Revenue	...	100,503.39	26,886.32	45,434.14	22,856.33	195,680.18
Expenditure.						
Field Staff	...	3,834.00	1,800.00	1,584.00	1,080.00	8,298.00
Transport Allowances	...	377.73	250.83	83.84	88.96	801.36
Transport Expenses	...	679.18	392.69	257.12	155.87	1,484.86
Uniforms	...	70.50	34.25	66.50	33.45	204.70
Material and Tools	...	591.20	189.30	78.29	71.57	930.36
Cultivation Expenses	...	28,407.90	9,088.80	6,728.80	4,168.75	48,394.25
Clove Harvest Expenses	...	5,010.46	374.42	—	—	5,384.88
Coconut Gathering Expenses	...	16,160.68	4,201.11	8,466.81	4,559.16	33,387.76
Copra Manufacture Expenses	...	10,579.22	2,979.06	6,604.96	3,545.73	23,708.97
Repairs to Buildings, etc.	...	4,890.83	1,452.55	995.19	798.33	8,136.90
Compost making at Marhubi	...	—	—	3,606.05	—	3,606.05
Incidental Expenses	...	—	—	—	9.37	9.37
Cost of Living Allowance	...	23,193.94	6,662.25	8,341.29	3,693.31	41,890.79
Total Expenditure	...	93,795.64	27,425.26	36,812.85	18,204.50	176,238.25
Revenue exceeds above expenditure by	...	6,707.75	583.94	8,621.29	4,651.83	19,441.93

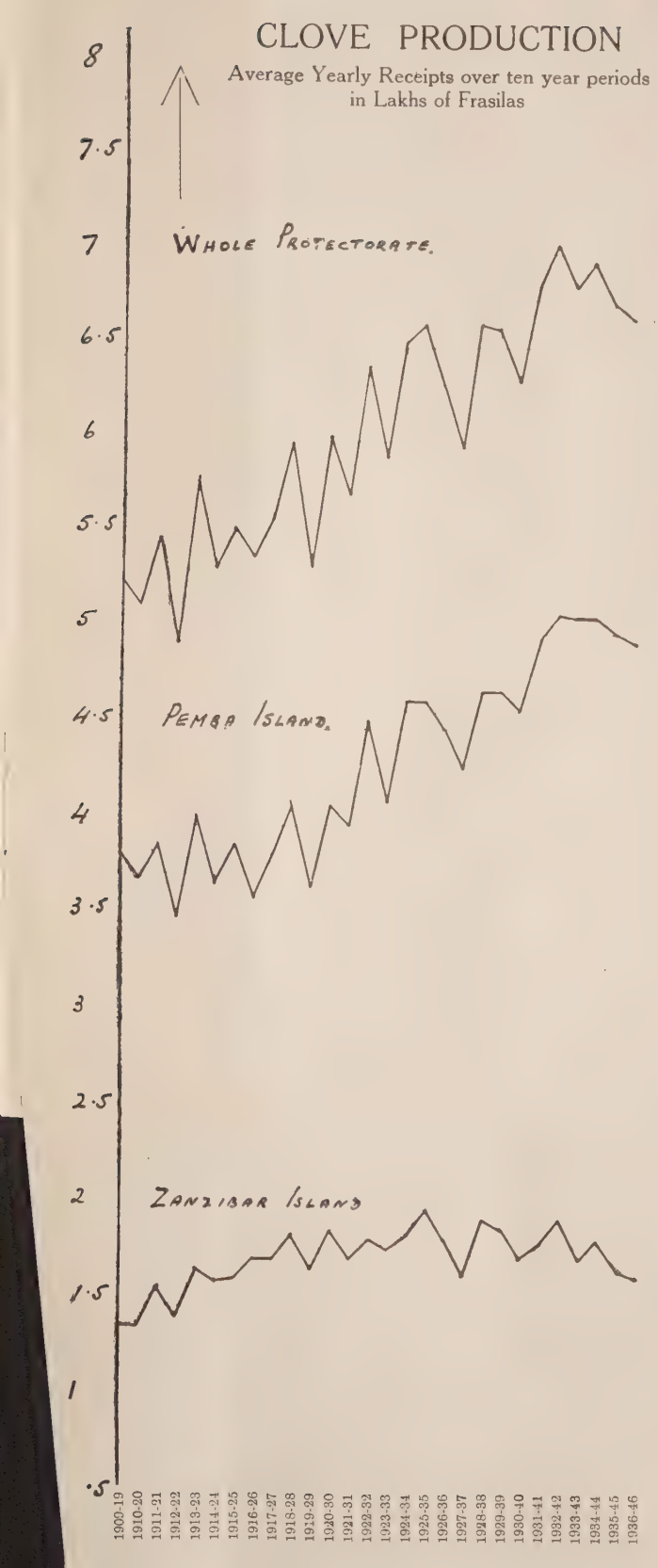
Appendix III.

Approximate Production of Cloves in Frasilas of 35 lb. for 35 Crop Years.

(1st July to 30th June)

(Based on receipts of cloves at the Central Market and Clove Growers Association).

Season.	Zanzibar Fras.	Pemba Fras.	Total Fras.	Mean Crop per Season in five-Year Periods Fras.
1911/12	216,507	582,153	798,660	—
1912/13	31,018	104,368	135,386	—
1913/14	145,586	638,094	783,680	—
1914/15	194,920	339,389	534,309	487,100
1915/16	141,641	655,116	796,757	608,200
1916/17	208,716	302,919	511,635	550,800
1917/18	63,958	234,239	298,197	583,300
1918/19	259,273	565,229	824,502	591,500
1919/20	93,847	168,703	262,550	538,700
1920/21	231,831	316,446	548,277	489,000
1921/22	65,819	200,983	266,802	440,100
1922/23	291,417	690,498	981,915	576,800
1923/24	75,017	236,767	311,794	474,300
1924/25	240,952	520,490	761,442	574,000
1925/26	219,192	392,622	611,814	586,800
1926/27	203,843	529,186	733,029	680,000
1927/28	190,370	500,382	690,752	621,800
1928/29	74,828	125,740	200,568	599,500
1929/30	318,647	610,296	928,943	633,000
1930/31	51,796	201,320	253,116	561,300
1931/32	175,070	760,786	935,856	601,800
1932/33	242,772	244,594	487,366	561,200
1933/34	146,098	781,090	927,188	706,500
1934/35	360,037	503,415	863,452	693,400
1935/36	65,938	232,571	292,509	702,500
1936/37	45,096	351,568	396,644	594,600
1937/38	446,500	909,416	1,355,916	768,300
1938/39	39,879	115,211	155,090	612,000
1939/40	168,041	501,474	669,515	575,100
1940/41	146,323	575,277	721,600	655,700
1941/42	297,578	889,500	1,187,128	817,800
1942/43	40,049	223,691	263,740	599,400
1943/44	236,423	777,218	1,040,641	776,500
1944/45	200,417	459,386	659,813	774,584
1945/46	26,493	161,075	187,568	667,800
Seasons	170,940	440,036	610,976	


CLOVE PRODUCTION
Average Yearly Receipts over ten year periods
in Lakhs of Frasilas
WHOLE PROTECTORATE.
PEMBA ISLAND.
ZANZIBAR ISLAND
8
7·5
7
6·5
6
5·5
5
4·5
4
3·5
3
2·5
2
1·5
1
·5
1900-19
1910-20
1911-21
1912-22
1913-23
1914-24
1915-25
1916-26
1917-27
1918-28
1919-29
1920-30
1921-31
1922-32
1923-33
1924-34
1925-35
1926-36
1927-37
1928-38
1929-39
1930-40
1931-41
1932-42
1933-43
1934-44
1935-45
1936-46

1st Order Station.

Non—Clove Growing Area.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT CHUKWANI PALACE, ZANZIBAR, 1946.

Lat. : 6° 15′S Long. : 39° 13′E Alt. : 69 feet. Standard Time 2h 45m East.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				No. of Days
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. + Min.	Total		Maximum Fall in 24 hours.		Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.	ins.	Date	
	F	F	F	F	%	%	F	F	F	F	F					
January ...	82.2	90.1	74.3	74.3	77	60	96.9	72.7	92 2	75.1	83.7	5.8	0.23	0.19	12	3
February ...	81.2	92.2	73.4	74.8	77	57	98.7	73.1	94.4	75.1	84.7	2.3	0.09	0.09	27	1
March ...	82.8	91.9	75.2	77.0	78	62	101.7	73.2	95.4	76.4	85.9	30.7	1.21	0.65	1	7
April ...	80.7	86.5	77.0	77.4	88	74	97.8	73.0	88.6	77.3	82.9	233.7	9.20	2.22	9	19
May ...	78.2	82.7	74.8	74.3	89	76	87.0	71.5	83.9	75.5	79.7	372.6	14.67	3.24	5	12
June ...	76.7	82.9	72.0	71.4	85	68	88.0	70.3	84.1	74.7	79.4	0.3	0.01	0.01	26	1
July ...	74.9	82.1	70.5	69.8	86	67	86.0	70.9	83.3	73.2	78.3	5.8	0 23	0.13	26	5
August ...	76.0	82.8	71.4	69.8	86	65	86.5	69.0	83.7	73.0	78.3	30.7	1.21	0.84	14	9
September ...	76.3	82.8	72.0	71.1	87	68	87.5	70.0	84.4	71.7	78.1	94.5	3.72	1.35	22	21
October ...	78.7	85.1	74.1	73.8	86	69	96.7	69.9	87.1	72.3	79.7	107.9	4.25	2.32	26	13
November ...	81.7	86.2	76.1	77.2	83	75	92.1	71.1	88.4	74.2	81.3	175.3	6.90	3.15	12	11
December ...	82.7	87.4	77.2	76.5	83	70	92.9	74.3	89.4	76.1	82.7	97.0	3.82	1.86	8	18
Year ...	79.3	86.1	74.0	73.9	84	68	101.7	69.0	87.9	74.5	81.2	1156.6	45.54	3.24	May 5	120

2nd Order Station. Non-Clove Growing Area.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT VICTORIA GARDENS, ZANZIBAR, 1946.

Lat. : 6° 10′S Long. : 39° 11′E Alt. : 18 feet. Standard Time 2h 45m East.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				No. of Days
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. + Min.	Total		Maximum Fall in 24 hours		Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.	ins.	Date	
	F	F	F	F	%	%	F	F	F	F	F					
January ...	81.4	88.4	74.7	73.2	80	61	92.5	74.0	90.0	76.4	82.2	4.1	0.16	0.05	2	5
February ...	81.1	89.3	73.8	72.3	78	58	93.4	73.8	90.9	76.1	83.5	5.6	0.22	0.20	27	2
March ...	83.4	89.7	75.4	74.5	77	61	100.0	74.2	92.1	76.7	84.4	19.3	0.76	0.26	27	6
April ...	81.5	86.2	76.8	76.8	86	74	93.0	73.4	88.1	76.8	82.5	258.3	10.17	2.90	13	19
May ...	79.3	83.1	74.3	74.5	85	75	88.8	71.6	85.1	74.9	80.0	322.3	12.69	3.85	18	13
June ...	77.3	84.2	72.3	70.7	84	64	87.0	72.0	85.2	74.7	79.9	1.3	0.05	0.05	26	1
July ...	75.6	83.1	71.1	70.0	86	65	85.7	69.5	84.2	72.1	78.1	15.2	0.60	0.30	29	6
August ...	76.1	83.8	71.6	69.8	86	63	87.6	68.5	85.1	72.0	78.5	42.4	1.67	0.58	14	14
September ...	77.1	83.0	72.1	71.1	84	68	89.0	68.4	84.8	70.8	77.8	143.3	5.64	0.97	17	20
October ...	78.6	83.1	73.0	72.9	83	71	89.2	68.3	85.2	71.2	78.2	211.6	8.33	2.89	23	14
November ...	82.0	84.7	75.7	75.2	81	74	91.0	70.4	87.1	73.6	80.3	222.2	8.75	2.82	12	14
December ...	83.1	87.7	76.3	74.7	80	65	91.7	73.0	89.2	76.4	82.8	84.1	3.31	0.98	9	12
Year ...	79.7	85.5	73.9	73.0	83	67	100.0	68.3	87.3	74.3	80.8	1329.7	52.35	3.85	May 18	126

Temperature Station. Clove Growing Area.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT KIZIMBANI, ZANZIBAR, 1946.

Lat.: 6° 05'S Long.: 39° 16'E Alt.: 220 feet. Standard Time 2h 45m East.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				No. of Days
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. + Min.	Total		Maximum Fall in 24 hours		Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.	ins.	Date	
	F	F	F	F	%		F	F	F	F	F					
January ...	81.1		73.2		76		90.0	65.0	87.4	72.2	79.8	3.6	0.14	0 06	2	3
February ...	81.2		72.1		73		94.8	70.0	88.1	72.6	80.3	3.0	0.12	0.12	27	1
March ...	83.3		73.6		72		92.8	71.2	90.1	73.6	81.9	56.1	2.21	0.87	1	5
April ...	80.8		75.2		83		90.7	71.5	86.2	73.9	80.1	264.2	10.40	2.28	11	18
May ...	79.4		73.0		81		89.0	69.8	84.4	72.3	78.3	280.2	11.03	3.50	16	13
June ...	76.5		71.1		83		86.8	68.8	82.9	71.0	76.9	22.9	0.90	0.49	26	5
July ...	74.9		70.5		85		83.5	68.0	81.9	72.9	77.4	41.4	1.63	0 63	19	10
August ...	75.0		70.7		86		85.0	68.3	81.7	72.7	77.2	110.2	4.34	0.83	11	16
September ...	76.6		71.4		83		85.0	65.0	81.8	69.5	75.7	117.6	4.63	1.24	20	22
October ...	79.5		73.6		82		86.0	66.0	83.4	70.5	76.9	193.8	7.63	3.00	27	11
November ...	81.2		73.9		78		88.1	67.0	85.8	71.3	78.5	164.1	6.46	3.29	12	13
December ...	81.4		75.2		81		89.0	70.8	86.4	73.9	80.1	188.2	7.41	2.84	9	14
Year ...	79.2		72.8		80		94.8	65.0	85.1	72.2	78.6	1445.3	56.90	3.50	May 16	131

Temperature Station. Clove Growing Area.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT WETE, PEMBA 1946.

Lat.: 5°04'S Long.: 39° 43'E Alt.: 60 feet. Standard Time 2h 45m East.

Month	Temperature				Relative Humidity		Extremes of Temperature of the Air					Rainfall				No. of Days
	Dry Bulb		Dew Point		h	h	Max.	Min.	Mean Max.	Mean Min.	½ Max. + Min.	Total		Maximum Fall in 24 hours		Rain
	8.30	14.30	8.30	14.30	8.30	14.30						mm.	ins.	ins.	Date	
	F		F		%		F	F	F	F	F					
January ...	81.9		72.7		74		89.0	69.5	87.0	74.6	80.8	9.9	0.39	0.34	11	3
February ...	81.3		72.1		74		90.7	70.9	88.0	74.0	81.0	1.5	0.06	0.03	27	3
March ...	84.1		73.2		70		92.8	72.3	89.8	75.1	82.5	27.9	1.10	0.56	29	4
April ...	82.6		75.9		81		92.0	73.5	87.3	75.4	81.3	399.5	15.73	2.20	11	22
May ...	79.9		73.6		81		88.0	69.5	83.8	73.2	78.5	590.0	23.23	7.68	16	18
June ...	78.7		72.3		81		85.2	68.2	82.4	72.4	77.4	55.4	2.18	0.95	27	15
July ...	77.2		71.4		82		84.0	67.9	81.8	70.8	76.3	29.7	1.17	0.25	21	15
August ...	77.6		71.2		81		84.0	67.0	82.4	69.9	76.1	54.1	2.13	0.41	6	14
September ...	78.7		71.6		79		85.7	57.0	83.5	69.4	76.5	176.0	6.93	3.58	22	14
October ...	80.1		72.7		79		86.2	67.5	84.4	70.4	77.4	142.2	5.60	2.35	27	13
November ...	83.2		75.2		77		90.0	69.7	87.0	73.2	80.1	205.2	8.08	1.32	26	18
December ...	83.4		76.1		79		88.7	73.8	87.3	75.5	81.4	52.6	2.07	0.61	5	10
Year ...	80.7		73.2		78		92.8	67.0	85.4	72.8	79.1	1744.0	68.67	7.68	May 16	149

Rainfall Station. Clove Growing Area.

SUMMARY OF METEOROLOGICAL OBSERVATIONS AT MWERA, ZANZIBAR, 1946.

Lat. : 6°09′S Long. : 39° 16′E Alt. : 80 feet. Standard Time 2h 45m East.

Month	Temperature				Relative Humidity		Rainfall				Number of Days of
	Dry Bulb		Dew Point		h	h	Total		Maximum Fall in 24 hours		Rain
	8.30	14.30	8.30	14.30	8.30	14.30	mm.	ins.	ins.	Date	
	F		F		%						
January ...	83.4		72.3		68		0.5	0.02	0.02	17	1
February ...	82.1		75.4		80		3.8	0.15	0.15	27	1
March ...	80.4		75.4		84		70.6	2.78	1.51	29	5
April ...	81.3		76.3		85		466.6	18.37	3.20	11	23
May ...	79.5		74.1		83		327.4	12.89	4.00	18	13
June ...	83.2		76.3		79		109.2	4.30	4.00	26	2
July ...	78.1		74.1		87		29.7	1.17	0.23	25	13
August ...	78.0		71.2		80		64.8	2.55	0.68	14	12
September ...	78.7		70.5		76		108.2	4.26	0.72	17	16
October ...	79.8		71.8		77		233.5	9.19	2.30	26	13
November ...	80.0		70.5		72		201.2	7.92	2.02	26	11
December ...	79.6		69.4		71		197 4	7.77	2.76	9	12
Year ...	80.3		73.1		79		1812.9	71.37	4.00	May 18 and June 26	122

RAINFALL STATIONS, 1945.

Month	CLOVE GROWING AREAS																		NON-CLOVE GROWING AREAS			
	Dole		Selem		Mkokotoni		Mkwajuni		Kigomacha		Mtanga-twani		Mkoani		Mtambile		Limbani		Wesha		Chwaka		Makundu-chi	
	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days	Rain	Wet Days
January ...	0.15	1	0.05	3	0.00	...	0.07	1	0.00	...	0.05	2	0.43	2	0.98	4	0.28	2	0.85	4	0.08	2	0.21	1
February ...	0.02	1	0.10	3	0.34	1	0.16	2	0.00	...	0.31	1	0.28	1	0.20	1	0.00	...	0.06	1	0.03	2	0.22	1
March ...	1.67	5	1.55	5	2.64	4	1.64	5	2.27	3	1.56	3	0.75	2	1.10	5	3.01	5	1.49	3	0.90	4	2.07	5
April ...	10.56	18	15.01	20	8.53	14	6.26	17	6.02	14	11.68	23	10.51	17	9.63	20	14.13	20	12.62	18	9.71	19	12.04	13
May ...	12.91	12	12.09	14	10.54	10	10.54	10	20.85	16	23.19	18	28.67	15	27.41	14	26.71	15	29.40	14	14.80	12	22.13	13
June ...	0.69	4	0.54	6	1.91	3	1.11	5	4.20	15	1.92	19	3.90	14	3.98	12	2.80	20	3.06	15	1.29	7	1.41	3
July ...	0.97	6	1.66	10	1.36	2	1.34	8	2.26	10	2.23	23	1.09	14	2.66	16	1.40	10	0.99	12	1.10	9	0.60	1
August ...	2.12	8	3.45	16	5.72	8	7.08	23	3.09	17	2.63	17	2.93	15	3.04	16	1.97	12	2.66	15	2.93	15	1.58	4
September ...	4.43	14	5.34	21	4.51	7	4.33	20	10.79	14	8.71	15	4.01	14	3.28	13	6.95	9	5.33	14	3.26	17	2.39	6
October ...	10.03	8	10.29	16	2.67	4	5.88	11	7.11	10	5.55	12	6.91	9	6.60	9	10.55	9	3.58	10	3.09	7	4.18	5
November ...	6.63	10	7.79	13	1.65	4	3.61	9	2.05	7	5.50	12	8.71	12	7.60	16	6.52	13	3.48	9	2.09	6	0.43	4
December ...	7.88	14	3.93	15	0.92	3	2.67	10	0.52	5	4.68	10	3.57	10	7.38	14	3.85	13	3.81	10	3.73	9	6.12	4
Total 1946 ...	58.06	101	61.80	142	40.79	60	44.69	121	59.16	111	68.01	155	71.76	125	73.86	140	78.17	128	67.33	125	43.01	109	53.38	60
Total 1945 ...	58.15	123	68.02	169	47.15	67	51.96	144	60.56	140	79.25	153	96.33	150	104.97	173	83.94	153	76.86	165*	57.70	137	63.34	78

Note : Rainfall in inches.

*No record for November, 1945. Figure represents average of previous 8 years (1934 - 1941).